

**Textbox A.1.** The structured representation of the key entities and relationships involved in the proposed semantic OWL ontology, facilitating effective knowledge representation and reasoning about user behaviors, preferences, and goals.

**Classes and sub-classes:**

- User
- UserProfile
- Preferences
  - Goal-Settings
  - InteractionType
  - ResponseType
- LifestyleParameters
- Routine
- LocationSpecific
- LocationName
  - Weather
  - Longitude
  - Latitude
- TemporalEntity
  - Time\_(hh:mm:ss)
  - Date
- Sleep
- Habit
  - Alcohol\_consumption
  - Tobacco\_consumption
- Activity
- Diet
  - Water\_consumption
- Recommendation
  - ActivityRecommendation
  - DietaryRecommendation
  - HabitualRecommendation
  - SleepRecommendation
- RecommendationMessage
  - MessageBody
  - MessageIntent
- Intensity
- CalorieRestriction
- Duration
- Equipment
  - Measurement\_type
  - Measurement\_value
  - Name
- FoodType
  - Alcoholic\_beverages
  - Discretionary\_foods
  - Energy\_drinks
  - Fruit\_drinks
  - Fruits
  - Milk-based\_coffee\_drinks
  - Soft\_drinks
  - Vegetables\_salads
- Frequency
  - Count
  - Question
    - Message

- Response\_chatbot
- Sentiment

**Properties (Domain, Range):**

- hasProfile (User, UserProfile)
- hasPreferences (User, Preferences)
- hasParameters (User, LifestyleParameters)
- hasActivity (LifestyleParameters, Activity)
- hasDiet (LifestyleParameters, Diet)
- hasHabit (LifestyleParameters, Habit)
- hasSleep (LifestyleParameters, Sleep)
- hasCalorieRestriction (Diet, CalorieRestriction)
- hasDuration (Activity, Duration)
- hasDuration (Sleep, Duration)
- hasDuration (Habit, Duration)
- hasEquipment (Activity, Equipment)
- hasFoodType (Diet, FoodType)
- hasFrequency (User, Frequency)
- hasLocation (User, LocationSpecific)
- hasRecommendation (User, Recommendation)
- hasMessage (Recommendation, RecommendationMessage)
- hasRoutine (User, Routine)
- hasTemporalEntity (Activity, TemporalEntity)
- hasTemporalEntity (Diet, TemporalEntity)
- hasTemporalEntity (Habit, TemporalEntity)
- hasTemporalEntity (Sleep, TemporalEntity)
- hasTemporalEntity (Recommendation, TemporalEntity)

**Relationships and Usage:**

- The *User* class is the central entity that has relationships with different aspects of *LifestyleFactors* such as *Activity*, *Sleep*, *Diet*, and *Habit*.
- Each *User* has its own location information (e.g., *LocationSpecific*).
- The *UserProfile* class stores user-specific information including health data.
- *Preferences* influence the selection of specific activities, diets, and habits, goals, interaction type and response types.
- The *Activity* class includes properties like intensity, duration and frequency of physical activity and details of equipment for measurement.
- The *Diet* class includes properties related to food types and caloric restrictions.
- The *Sleep* class includes properties related to sleep duration.
- The *Habit* class includes properties related to alcoholic and tobacco consumption with duration.
- Different levels of intensity, frequency, food types, routines, durations, etc., are represented by separate classes with specific properties.
- The *Frequency* class includes chatbot interactions.
- The *Recommendation* class includes different categories of recommendation messages.
- The *RecommendationMessage* class includes intent and bodies of the recommendation messages.
- The *TemporalEntity* class includes date and time.